

Division VIII of Title 5 of the California Code of Regulations

Proposed Addition of Sections 80416, 80416.1, and 80416.2 of Title 5, California Code of Regulations, Pertaining to Single Subject Teaching Credentials in Science (Specialized) and in Foundational-Level Mathematics

INITIAL STATEMENT OF REASONS

Purpose and Rationale for Proposed Regulations

One of the requirements needed to obtain a Single Subject Teaching Credential is verification of subject matter competency. Currently there are sixteen subject matter areas: Agriculture, Art, Business, English, Foreign Languages, Home Economics, Health Science, Industrial and Technology Education, Mathematics, Music, Physical Education, Science: Biological Sciences, Science: Chemistry, Science: Geosciences, Science: Physics, and Social Science. The proposed addition of Sections 80416, 80416.1, and 80416.2 to the Title 5 Regulations would increase the number of subject matter areas to twenty-one by adding Foundational-Level Mathematics and four new areas in science: Biological Sciences (Specialized), Chemistry (Specialized), Physics (Specialized), and Geosciences (Specialized). The current mathematics and science authorizations will remain available to credential candidates.

The addition of the subject matter areas in Science (Specialized) and in Foundational-Level Mathematics for Single Subject Teaching Credentials is being proposed as a potential means of increasing the number of newly credentialed science and mathematics teachers for California public schools. The proposed Science (Specialized) authorization would allow instruction in a specific science area (biology, chemistry, physics, or geosciences) in California public schools but would not authorize instruction in general or integrated science. The proposed Foundational-Level Mathematics authorization would permit the holder to teach the content areas taught to the vast majority of K-12 math students: general mathematics, algebra, geometry, probability and statistics, and consumer mathematics. It is anticipated that the adoption of these two proposed subject matter areas will attract knowledgeable and experienced individuals, including engineers, environmentalists and others, to investigate a second career in teaching.

Over the years, California has often experienced a need for credentialed teachers in mathematics and science. Recently, this has become much more apparent with the consistently low number of teacher candidates majoring in mathematics and science at California campuses and the growth of the K-12 student population. The proposed Title 5 regulations establishing the Single Subject Teaching Credentials in Science (Specialized) and in Foundational-Level Mathematics provides a partial solution to the under-supply of qualified teachers in these two areas. A disproportionate number of teachers in the fields of mathematics and science are employed based on emergency permits or waivers. In the 2000-2001 school year, there were approximately 16,700 mathematics teachers in California's public schools. Nearly 14% (almost 2,200) were teaching with emergency permits or waivers. In stark contrast, only 704 teachers during that same year were issued Single Subject Teaching Credentials in mathematics based on a California institution recommendation or completion of a credential program outside of California. In that same

year there were close to 13,300 teachers teaching science. Of those teachers, over 2,800 were teaching science with an emergency permit or waiver. In comparison, during 2000-2001, less than 1000 individuals received science certification through California institutional recommendations and out-of-state programs.

As part of the task of reviewing the new K-12 Student Academic Content Standards, the Commission charged its Subject Matter Advisory Panels in Science and Mathematics with exploring possible changes in the existing single subject credential structures that might encourage more individuals to obtain science and mathematics certification. The panel members, who are practicing science and mathematics teachers, faculty members and other California educators, proposed the addition of the Science (Specialized) and Foundational-Level Mathematics subject matter areas with the hope of attracting an untapped pool of candidates. Their proposals were made based on the provision that individuals seeking certification in these new areas would need to complete all other requirements for the Single Subject Teaching Credential, including a baccalaureate degree, an appropriate teacher preparation program, the California Basic Educational Skills Test (CBEST), and personal and professional fitness verification.

The rationale and the benefits for the addition of these each sections are addressed below.

§80416. Subject Matter Knowledge for Single Subject Teaching Credentials in Science (Specialized) and Foundational-Level Mathematics:

The addition of this section establishes that, as with all other subject matter areas, the subject matter will be based on standards of program quality and effectiveness and aligned with the current K-12 student standards. This will guarantee that the high level of content quality expected of California teachers will be maintained.

§80416.1. Single Subject Teaching Credential in Science (Specialized)

The proposed Section 80416.1 establishes the specific science subject matter areas that will be available to Single Subject Teaching Credential candidates. Under this new structure, the specific sciences will be biological sciences, chemistry, physics, and geosciences. The section also stipulates that the authorization for these subject matter areas will be limited to the specific science area requested. Because of the holder's specialized scientific knowledge, none of these science areas will authorize the individual to teach general or integrated science. The authorization is for service in grades preschool, kindergarten through twelfth, and in classes organized for adults. This grade range is consistent with that authorized by Single Subject Teaching Credentials in all other subject matter areas.

This proposed regulation also details three options that may be used to satisfy the subject matter competency. The first of these options is completion of a post-baccalaureate degree from a regionally accredited institution. This will need to be in either the requested science area or in a closely related area considered equivalent by the Commission. Under the second option, candidates may verify their subject matter competency in the specialized science by passing a Commission-approved examination. The third option allows a prospective teacher with a bachelor's degree in the science

requested and 30 semester units of postgraduate work in the same area, or closely related area, to meet the subject matter requirement for a Single Subject Teaching Credential.

Establishing this specialized science authorization would provide additional flexibility for those considering a career as a science teacher. These options are especially well suited to candidates who have already demonstrated their subject matter knowledge through advanced programs or training in a specific scientific field and decide, as career-changers, to enter the teaching profession. Additionally, this proposal will have the potential to increase the number of science teachers and provide staffing options for districts and schools who currently have difficulty finding credentialed teachers. This will be especially helpful for district recruiters who are seeking teachers for advanced and Advanced Placement (AP) science courses to replace the baby-boomer population of teachers who will soon be retiring.

§80416.2. Single Subject Teaching Credential in Foundational-Level Mathematics

This proposed section would allow Single Subject Teaching Credential candidates to verify subject matter competence in the area of Foundational-Level Mathematics. These candidates would have the option of satisfying competency in this subject matter area either by completing a Commission-approved subject matter program or by passing an appropriate Commission-approved subject matter examination. The content knowledge verified by either of these two options, as stipulated in the proposed §80416, is derived from and aligned with the current K-12 student standards, focusing on the fields of mathematics to be authorized by this subject matter area. The knowledge needed in these specific fields of mathematics is equivalent in depth and rigor to that required in these fields for the current Mathematics subject matter area. Because of this, individuals verifying competency in Foundational-Level Mathematics will be fully prepared in these specific fields. Unlike the current Mathematics subject matter area and as reflected in the authorization for this proposal, the individual seeking certification in Foundational-Level Mathematics will not be required to verify in-depth knowledge of advanced mathematics nor will they be authorized to teach in these fields.

The subject matter area in Foundational-Level Mathematics is proposed as a measure to help alleviate some of the teacher shortage in mathematics by attracting more individuals into this area. When the Subject Matter Advisory Panel in Mathematics initially investigated the difficulties facing California school districts, the points that impacted their decision to recommend a Foundational-Level Mathematics authorization were the high percentage of teachers functioning on emergency permits and the low number of candidates qualifying for the Single Subject Teaching Credential in Mathematics. They also considered the rising need for mathematics teachers, not only to replace those leaving through attrition but also to staff new classes resulting from increases in the student population and class-size reduction. Another issue that they considered was the fields of mathematics predominantly taught to California students. In the 1999-2000 school year, more than 97% of high school mathematics students were enrolled in classes that covered fields in mathematics that were below calculus or other advanced level coursework. When the panel considered a two-tiered mathematics authorization, they, along with the Commission, sought further information regarding the likelihood of any benefits that this credential structure might have. Based on their advice, a study was conducted, surveying

district human resource directors, middle and high school principals, middle and high school mathematics teachers, mathematics faculty, and mathematics education faculty at institutions with approved mathematics programs. The majority of responses supported this concept and affirmed the respondents' belief that a two-tiered mathematics credential would increase the potential pool of mathematics teachers available for the basic mathematics courses.

This proposed section of the regulation would specify the fields in mathematics that the holder of a Single Subject Teaching Credential in Foundational-Level Mathematics would be authorized to teach: general mathematics, algebra, geometry, probability and statistics, and consumer mathematics. Individuals will not be authorized to teach any of these fields if students receive advanced placement credit for the course or to teach courses in any more advanced fields of mathematics. Additionally, as with the Science (Specialized) authorization, this proposed regulation re-emphasizes that holders of the Foundational-Level Mathematics authorization may teach this in any grades in which the subject or subjects will be taught, to include preschool, grades kindergarten, grades one through twelve, inclusive, and classes organized primarily for adults.

Reports Relied Upon in Preparing Regulations

The following reports were relied upon in preparing the proposed Title 5 additions:

- 1998-99 Annual Report: Emergency Permits and Credential Waivers, Commission on Teacher Credentialing
- 2000-01 Annual Report: Emergency Permits and Credential Waivers, Commission on Teacher Credentialing
- Characteristics and Performance of Advanced Placement Classes in California, June 2001
- Enrollment in California Public Schools, 1993-2002
- Estimated Number of Teacher Hires During 2002-03 by Subject Area, October 2001
- Mathematics Framework for California Public Schools, 1999 (This includes the Mathematics Content Standards for California Public Schools)
- Preparation of Secondary School Mathematics Teachers in the California State University, March 2002
- Proposed Exploration for the Restructuring of the Single Subject Credential for Mathematics Teachers, 2001
- Science Content Standards for California Public Schools, 1998
- Statewide Course Enrollment and Staffing Data, 1999-2000
- Statewide Course Enrollment and Staffing Data, 2000-2001
- Teacher Supply in California: A Report to the Legislature (Fourth Annual Report, 2000-01)

- Teachers Meeting Standards for Professional Certification in California: Second Annual Report 1998-99
- Teachers Meeting Standards for Professional Certification in California: Third Annual Report, 1999-00

Documents Incorporated by Reference

None

Alternatives Considered

The Commission has reviewed reasonable alternatives to the current science and mathematics authorizations for the Single Subject Teaching Credential. For the proposed science (specialized) subject matter area, the Commission accepted the recommendation from the Subject Matter Advisory Panel in Science and incorporated all three alternatives into the proposed regulations as options for satisfying this requirement.

For the proposed foundational-level mathematics subject matter area, the Subject Matter Advisory Panel in Mathematics made much broader recommendations. The recommendations, and the rationale for not pursuing them, are the following:

- *Mathematics Specialist:* This proposed alternative would limit the authorization of the single subject mathematics credential to teach mathematics courses up to a designated level, such as second-year algebra. Individuals interested in teaching advanced mathematics courses would complete a secondary teacher education program and verify the current subject matter competence through coursework or examination, resulting in the mathematics specialist instruction credential. This alternative was considered, but because the specialist credentials generally require a year of study beyond the teaching credential and allow individuals to act as curriculum specialists in the field, the Commission thought that this would be an inappropriate venue for a mathematics teaching credential.
- *Advanced Supplementary Authorization:* This alternative proposed the introduction of a new advanced supplementary authorization in mathematics that falls between the current supplementary authorization and the single subject authorization. This alternative was not pursued because the individual would also need a single subject teaching credential with a subject matter area in something other than mathematics. This would not entice highly knowledgeable individuals from other professions, such as engineers and statisticians, into teaching.
- *Maintain the Current Mathematics Structure:* The panel's third alternative was to retain the current credentialing structure. By doing this, California's increasing shortage of mathematics teacher, which instigated this proposed regulatory action, would remain.

Before approving any proposed changes to the regulations, the Commission must determine that no alternative considered will be more effective in carrying out the purpose for which the action is proposed or will be as effective and less burdensome to affected private persons or small businesses than the proposed action.